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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/611,849	07/03/2003	Barry E. Burns	ICC-167/181/PCT/US/DIV	3903

7590

05/06/2004

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EXAMINER

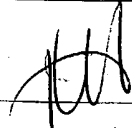
SELLERS, ROBERT E

ART UNIT	PAPER NUMBER
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1712

DATE MAILED: 05/06/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/611,849	Applicant(s) BURNS ET AL.	
	Examiner Robert Sellers	Art Unit 1712	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 July 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 33-50 is/are pending in the application.
- 4a) Of the above claim(s) 37-39 and 42-50 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 33-36, 40 and 41 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☒ Claim(s) 33-50 are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 10 November 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☒ Certified copies of the priority documents have been received in Application No. 09/600,425.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>7/3/03</u> . | 6) <input type="checkbox"/> Other: _____ |

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1. Restriction to one of the following inventions is required under 35 U.S.C. 121:
 - I. Claims 33-36, 40 and 41, drawn to a composition comprising an epoxy resin, a latent hardener, a thixotropic agent and a solid organic acid, classified in class 523, subclass 455.
 - II. Claims 37-39 and 42, drawn to Invention I further comprising a polythiol, classified in class 523, subclass 456.
 - III. Claims 43 and 44, drawn to a mounting structure for semiconductor devices comprising a semiconductor device of a semiconductor chip mounted on a *carrier substrate* sealed on a circuit board with the composition of Invention I or II, respectively, classified in class 257, subclass 793.
 - IV. Claims 45 and 46, drawn to an electronic device comprising a semiconductor device *electrically connected* to a circuit board mounted with the composition of Invention I or II, respectively, classified in class 428, subclass 620.
 - V. Claims 47 and 48, drawn to a method of mating an electronic component with a carrier substrate using the composition of Invention I or II, respectively, classified in class 156, subclass 330
 - VI. Claims 49 and 50, drawn to a method of underfilling a space between an electronic component and a carrier substrate utilizing the composition of Invention I or II, respectively, classified in class 156, subclass 305.

The inventions have been condensed from those originally proposed due to the equivalency between the mounting structures, electronic devices, methods of mating an electronic component and methods of underfilling regardless of whether the polythiol is present.

The inventions are distinct, each from the other because:

2. Inventions I and II are related as mutually exclusive species in an intermediate-final product relationship. Distinctness is proven for claims in this relationship if the intermediate product is useful to make other than the final product (MPEP § 806.04(b), 3rd paragraph), and the species are patentably distinct (MPEP § 806.04(h)). In the instant case, the intermediate product is deemed to be useful as a molding composition and the inventions are deemed patentably distinct since there is nothing on this record to show them to be obvious variants.
3. Inventions (I or II) and (III or IV) are related as mutually exclusive species in an intermediate-final product relationship. Distinctness is proven for claims in this relationship if the intermediate product is useful to make other than the final product (MPEP § 806.04(b), 3rd paragraph), and the species are patentably distinct (MPEP § 806.04(h)). In the instant case, the intermediate product is deemed to be useful as a coating formulation and the inventions are deemed patentably distinct since there is nothing on this record to show them to be obvious variants.

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4. The mounting structure of Invention III is structurally distinct from the electronic device of Invention IV due the additional presence of the carrier substrate in the mounting structure and the electrical connection between the semiconductor device and circuit board of Invention IV.

5. The method of underfilling of Invention VII involves the sealing of an already assembled electronic component and carrier substrate which is a materially different process from the mating of a separate electronic component and carrier substrate of Invention VI.

6. Inventions (V or VI) and (III or IV) are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make another and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case, the product as claimed can be made by another and materially different process such as dispensing the composition on the electronic component and mating it with the carrier substrate.

7. Inventions (I or II) and (V or VI) are related as product and process of use. The inventions can be shown to be distinct if either or both of the following can be shown: (1) the process for using the product as claimed can be practiced with another materially different product or (2) the product as claimed can be used in a materially different process of using that product (MPEP § 806.05(h)). In the instant case, the product as claimed can be used in a materially different process of using that product such as a method of coating a substrate.

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8. The mating method of Invention V constitutes the bonding of two separate components while the underfilling method of Invention VI requires the sealing of already connected components.

Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.

9. This application contains claims directed to the following patentably distinct species of the claimed invention:

- (a) The epoxy components.
- (b) The latent hardeners.
- (c) The solid organic acids.
- (d) Contingent upon the election of Inventions II or Inventions III-VI further containing a polythiol, a particular species of polythiol.

Applicant is required under 35 U.S.C. 121 to elect a single disclosed species for prosecution on the merits to which the claims shall be restricted if no generic claim is finally held to be allowable. Currently, claims 33-50 are generic.

A reply to this requirement must include an identification of the species that is elected consonant with this requirement, and a listing of all claims readable thereon, including any claims subsequently added. An argument that a claim is allowable or that all claims are generic is considered nonresponsive unless accompanied by an election.

Upon the allowance of a generic claim, applicant will be entitled to consideration of claims to additional species which are written in dependent form or otherwise include all the limitations of an allowed generic claim as provided by 37 CFR 1.141. If claims are added after the election, applicant must indicate which are readable upon the elected species. MPEP § 809.02(a).

Should applicant traverse on the ground that the species are not patentably distinct, applicant should submit evidence or identify such evidence now of record showing the species to be obvious variants or clearly admit on the record that this is the case. In either instance, if the examiner finds one of the inventions unpatentable over the prior art, the evidence or admission may be used in a rejection under 35 U.S.C. 103(a) of the other invention.

10. During a telephone conversation with Steven C. Bauman on April 30, 2004, a provisional election was made with traverse to prosecute Invention I, a diglycidyl ether of bisphenol A as the epoxy component, Ajicure PN-23 as the latent hardener (an adduct of EPON 828 bisphenol epoxy resin, 2-ethyl-4-methylimidazole and phthalic anhydride according to page 15, lines 15-17 of the specification) and barbituric acid as the solid organic acid, claims 33-36, 40 and 41. Affirmation of this election must be made by applicant in replying to this Office action. Claims 37-39 and 42-50 are withdrawn from further consideration under 37 CFR 1.142(b) as being drawn to non-elected inventions.

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The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

11. Claims 35 and 36 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors had possession of the claimed invention at the time the application was filed.

The 100 parts by weight of epoxy component as well as the broad ranges of latent hardener (page 30, lines 5-7), thixotropy-conferring component (page 28, line 2) and solid organic acid (page 18, lines 15-16) as well as the examples on pages 33-69 do not support the single numerical amounts of the components.

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

12. Claims 33, 34 and 40 are rejected under 35 U.S.C. 102(b) as being anticipated by Japanese Patent No. 4-266922.

Japanese '922 sets forth an adhesive solution (Derwent abstract accession no. 1992-363126, page 2, line 36) for a printed circuit board (Chemical abstracts accession no. 1993:193001, AB, lines 1-2) comprising bisphenol A epoxy resins, 2-phenyl-4-benzyl-5-(hydroxymethyl)imidazole (a species of latent hardener according to page 15, lines 25-26 of the specification), silica (a species of thixotropy-conferring component according to page 27, lines 3-6) and salicylic acid (a species of solid organic acid according to page 25, line 24).

13. Claims 35, 36 and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Japanese '922.

It would have been obvious to employ the specific proportions of the components of claims 35 and 36 in order to optimize the adhesiveness and consistency of the blend. (No translation of the Japanese patent was available to ascertain the proportion ranges of the components.). It would have been obvious to separately combine the latent hardener with a blend of the other components in order to prevent premature gellation.

Claims 33, 34 and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hirano et al. Patent No. 5,719,225.

14. Hirano et al. discloses a sealant for an electronic part (col. 14, lines 53-57) containing an epoxy resin (col. 3, lines 55-60), a latent hardener such as dicyandiamide (col. 8, line 67), silica (col. 4, lines 18-20) and polymerization inhibitors such as quinones or phenols (col. 9, lines 51-65, included as solid organic acids according to page 17, lines 5-13).

15. Although the polymerization inhibitors are not exemplified, it would have been obvious to incorporate the quinone or phenol described in Hirano et al. into the epoxy resin sealant in order to control the curing velocity.

Claims 33-36, 40 and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Japanese Patent No. 1-245014 in view of Hirose et al. Patent No. 4,546,155.

16. Japanese '014 espouses a semiconductor sealant prepared from an epoxy resin, a hardener, fused silica and a compound having at least three OH groups such as gallic acid (i.e. 3,4,5-trihydroxybenzoic acid, Chemical registry no. 149-91-7, named on page 25, line 23 and page 26, line 13 of the specification).

17. The claimed latent hardener is not recited. Hirose et al. teaches the use of the elected species of an adduct of Epon 828 bisphenol A epoxy resin, 2-ethyl-4-methylimidazole and phthalic anhydride (col. 5, lines 23-24, 43 and 46; and col. 6, Table 1, Sample Nos. 12-14) as a latent curing agent for an epoxy resin.

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18. It would have been obvious to employ the adduct of Hirose et al. as the hardener of Japanese '014 in order to provide curability at a lower temperature and superior storage stability (Hirose et al., col. 2, lines 17-20).

19. Claims 33 and 34 are rejected under 35 U.S.C. 102(b) as being anticipated by Japanese Patent Nos. 3-29532 or 5-3269.

20. Japanese '532 is directed to a semiconductor sealant derived from an epoxy resin, a phenol resin, a filler (Derwent abstract accession no. 1991-083603, page 2, line 14) and o-dihydric phenols such as 3,4,5-trihydroxybenzoic acid.

21. Japanese '269 discloses a semiconductor sealant of an epoxy resin, a phenol novolak resin hardener, fused silica and ascorbic acid (a species of solid organic acid according to page 25, line 24 and page 26, line 18 of the specification). The phenol novolak resin hardener is not activated until heated to a temperature of 175°C, thereby qualifying as a latent hardener according to page 14, lines 26-29 of the specification:

"Such a latent hardener should be substantially inactive at room temperature but be capable of activation at temperatures above 50°C to effect the heat cure of the epoxy resin."

Japanese '269 is not applicable to claim 40 defining a viscosity of from about 1-50 Pa's since the blend is palletized to a solid state prior to use.

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22. Claims 35, 36 and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Japanese '352 and '269.

It would have been obvious to employ the specific proportions of the components of claims 35 and 36 in order to optimize the adhesiveness and consistency of the blend. (No translation of the Japanese patents were available to ascertain the proportion ranges of the components.). It would have been obvious to separately combine the latent hardener with a blend of the other components in order to prevent premature gellation.

Claims 33-36, 40 and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Japanese Patent No. 1-29416 in view of Hirano et al. and Japanese '014.

23. Japanese '416 is drawn to a integrated circuit sealant obtained from a bisphenol A epoxy resin, a latent hardener (Derwent abstract accession no. 1-29416, page 2, lines 12-13) and a silica thixotropic agent.

24. The claimed solid organic acid is not recited. Hirano et al. and Japanese '014 are described hereinabove. It would have been obvious to incorporate the quinone or phenol polymerization inhibitor of Hirano et al. (col. 9, lines 51-65), or the 3,4,5-trihydroxybenzoic acid of Japanese '014 in order to control the curing velocity, or to prevent cracking, respectively.

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The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

25. Japanese Patent No. 63-63770 is directed to 3,4,5-trihydroxybenzoic acid as an inhibitor for the reaction between an epoxy resin and phenolic resol in the absence of a thixotropy-conferring component.

26. Ishimura et al. reveals the utilization of hydrazides (col. 11, lines 49-55) as curing agents for one-package epoxy resin systems for integrated circuit chip sealing (col. 12, line 68).

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5/4/04